

MODIS Team Meeting Minutes

Minutes of the MODIS Team Meeting held on Tuesday, November 28, 1995.

Action Items:

113. Determine the best method to display a fixed pattern noise (herringbone, Spec 3.4.5.3.3). Assigned to Knight 8/15/95. Due 10/15/95.

115. Locate a Heliostat drive for the Solar Diffuser Test. Assigned to Barnes 11/07/95. Due 12/22/95.

Distribution:

✓ Richard Weber	✓ Bruce Guenther	✓ Larissa Graziani
✓ John Bauernschub	✓ George Daelemans	✓ Bob Martineau
Rosemary Vail	✓ Mitch Davis	Bob Silva
✓ Lisa Shears	✓ Ken Anderson	Robert Kiwak
✓ Mike Roberto	✓ Rick Sabatino	✓ Harvey Safren
Gene Waluschka	Cherie Congedo	✓ Ed Knight
Bill Barnes	Jose Florez	Harry Montgomery
Les Thompson	Gerry Godden	✓ Marvin Maxwell
John Bolton	Sal Cicchelli	✓ Bill Mocarsky
		Helen Phillips

The following items were distributed:

- 1) Weekly Status Report #217
- 2) SBRC Memos submission from week #209
- 3) Minutes of the previous team meeting

MODIS Technical Weekly December 1, 1995

sent to MODIS.Review 12/4/95 at about 6:20 pm

1. Introduction

In this report, Jose Florez and Mitch Davis discuss shorts in the Formatter multilayer circuit card assembly (CCA) board. It was a re-layout problem. The board will be reworked, and, if necessary, changed out at a later time. Other boards are being checked to assure there are no additional layout problems.

Bob Martineau presents flight model detector status.

Ed Knight mentions fourteen reasons why the bench test cooler is needed for spacecraft level testing at LMAS.

Sal Cicchelli summarizes his early November trip to SBRC and Schaeffer Magnetics and gives special thanks to David Jones and Al DeForrest for their assistance. In a second email, Sal describes three basic issues which concern potential replacement of the GSE bearing in the 20 rpm

bearing test chamber. Sal recommends that if time is not critical, then start the replacement after the GSE bearing fails; use the same type of setup for the replacement; and the Schaeffer plan to move the bell jar setup on a cart to a cleanroom before breaking vacuum seems okay at this time.

Two items in the Systems Integration and Test (SI&T) Coordination Meeting handout material from Tom Koch for November 21 are clarified: structural enhancements for FM1 fold mirror, and chips around edge of LWIR window.

2. Jose Florez (Shorts in Multilayer Board)

Author: Jose Florez at 730

Date: 11/27/95 4:44 PM

Subject: Weekly Telecon with SBRC - 11/27/95

----- Message Contents

Not much to report from last week. Just one new item.

A short circuit between power and ground was detected during testing of the Formatter CCA. The short was observed before power was applied to the board.

Investigation of the problem disclosed that 4 vias were shorted between the card

layers. The problem was caused during PCB re-layout, when one (out of seven) of

the automated features of the CAD system to detect this type of problem was inadvertently left disabled. Three of the shorts can be corrected by lifting

pins from the board and using jumpers to route the signals. The fourth can only

be fixed by drilling the vias out. The board is going to be reworked in this

manner to proceed with the testing. If QA deems this board unsuitable for flight due to the rework, it can be replaced with a new flight board in March.

SBRC is looking back at the CAD records to verify that the problem does not exist in other CCA's as well.

Jose and Mitch

3. Ed Knight (The need for the BTC for ambient performance tests at LMAS)

Author: eknight@highwire.gsfc.nasa.gov (Ed Knight) at Internet

Date: 11/27/95 1:37 PM

Subject: BTC use at S/C I&T

----- Message Contents

To: Distribution November 27, 1995

From: Ed Knight

Subject: BTC for Ambient Performance Tests at LMAS--REBUTTAL

Reference: PL3095-M05387, #2592, BTC for Ambient Performance Tests at LMAS," by T. Pagano, November 7, 1995.

In the referenced memo, Tom Pagano presents several arguments for not using the BTC during S/C level tests. I disagree with this conclusion. This memo addresses the points raised by Tom and adds several additional issues.

Tom argues that using the VIS/NIR channels and the Electronic Calibration can provide sufficient monitoring and that the GOES precedence indicates there is low risk. These will be addressed in order.

VIS/NIR Channel monitoring

Tom argues that the similarity in the analog boards would allow us to presume that no problems will show up in the two cold focal planes that do not also show up in the warm focal planes. First, this is clearly not true for the PC bands, which have entirely different electronics. Second, this presumes that the monitoring of the VIS and NIR bands will be adequate. Given the limited life of the SRCA lamps, we cannot presume that we will be able to monitor responsivity as often as needed. Third, this presumes equivalence in responsivity and noise between the bands. Since each band has its gains and offsets set independently, they will each have their own sensitivity and noise levels. A signal that is imperceptible in the VIS may be very significant in the SWIR. Fourth, the optics trains are not equivalent. Spatial shifts due to acoustics (performed after thermal vacuum), or other changes in the MWIR and LWIR optics would go undetected. Fifth, one of our best contamination monitors is the check of response vs. scan angle using the SD sector. This can only be done in the thermal bands.

Electronic Calibration

Tom argues that electronic calibration for the thermal bands will be sufficient to look for irregular behavior. First, the stability of electronic calibration has not yet been demonstrated. Second, if there are observed irregularities, it is not clear how changes in the Ecal circuit are separated from changes in the instrument (on orbit, we would use linearity checks with the heated blackbody to gather additional information). Third, Ecal in the PC bands would be ambiguous. Since the PC bands remain connected during electronic calibration, any fluctuations in their signal would affect the electronic calibration results. On-orbit, this is overcome by performing Ecal while looking at space. If there is no SBS or SVS during spacecraft level tests, then there is no ground equivalent. Fourth, Ecal is very coarse. With only 10 or 25 steps in 4096 counts, it is not clear that it would have the required sensitivity. Fifth, Ecal is not supposed to be capable of absolute stability. Previously SBRC has stated that the Ecal was only good for a linearity

check of the electronics. Have they changed their minds about its usefulness for absolute stability?

GOES Precedence

Tom argues that there is historical precedence that the noise levels are not expected to change and quotes Marv Maxwell's memo on the GOES and AVHRR experience. First, GOES had more reasons to presume stability. Marv's memo of September 7 explicitly notes that the MODIS baseline tests are not as comprehensive as the GOES tests were. Second, MODIS does not have a post-acoustics check of the thermal bands like GOES and AVHRR. The EOS-AM1 spacecraft timeline as of November 1 shows acoustics being performed after T/V. This was reversed for the heritage instruments. Without using the BTC or changing the timeline, we have no check on how we did post-acoustics. Both of these items would lead us to be less well characterized than GOES or AVHRR. Are we willing to state that MODIS will not be as well characterized as heritage instruments?

Other Reasons

There are other reasons for using the BTC that Tom does not raise and need to be addressed. First, if the BTC is required for BAT to check that the MODIS survived shipping to Valley Forge, why is it not required after vibration or acoustic tests, which will surely be harsher? Second, we (SBRC and GSFC) have not yet established what parameters need to be trended and monitored to ensure the health and performance of the instrument. In giving up the BTC now, we would be eliminating the option of trending any thermal band performance parameters before instrument T/V has produced any data to support our decision. There is also the need for us to determine if the thermal bands need to have meaningful values during the end-to-end tests that include the ground system.

Conclusion

I've offered 14 reasons why other proposed strategies for monitoring system performance without the BTC will not work. We need the BTC at S/C level testing.

4.0 Bob Martineau (Flight Model Detector Status)

email from Bob, 11/28/95

November 28, 1995

SUBJECT: Weekly Input for 11/28/95

1) Flight Model SCAs:

- Four SCAs have been successfully hybridized and are currently being mounted and wire bonded into test carriers. Four units were hybridized to yield 2.

2) Flight Model 1 Detective Assemblies and FPAs:

- The F1 VIS and NIR FPAs have been delivered.
- F1 LWIR testing is complete. The F1 LWIR filter/bezel will be reworked with a new mask because of peeling of the filter mask coating observed on the existing mask. An F2 lot mask will be used.
- The F1 SMWIR DA (S/N 11) completed radiometric test. It has the same 2 soft pixels as observed in the SCA data. One more pixel in a different band fails uniformity at Qhi. The B26 replacement filter was installed. Receipt of the filter/bezel by the Focal Plane Array Group is expected Nov 28. CTI is planned for 12/8.

3) Flight Model 2 Detective Assemblies:

- The F2 VIS and NIR FPAs have been delivered.
- The F2 LWIR DA was wire bonded and will start radiometric tests this week.
- The F2 SMWIR DA (S/N 12) completed radiometric test except for response stability. The same 2 soft pixels were seen as on the SCA.

5.0 Sal Cicchelli (SBRC and Schaeffer Magnetics Trip)

Author: Sal Cicchelli <scicchel@div720.gsfc.nasa.gov> at Internet

Date: 11/30/95 10:10 PM

Subject: Early Nov 1995 SBRC Trip Report

----- Message Contents

The few days spent mostly at SBRC and partly at Schaeffer Magnetics were very valuable for becoming familiar with existing MODIS hardware and observing/working some real-time problems. Special thanks to David Jones and Al DeForrest for their assistance in allowing me to make very effective use of my time there.

My activities were essentially as follows:

The time at SBRC was spent touring the facilities and MODIS mockup, test and flight hardware. I observed the NIR improved epoxy configuration and reviewed the test specs for the Fold Mirror Penalty Vibration Test. In addition, I examined the configuration of the loading dock at which the MODIS heliostat test is being planned.

The time at Schaeffer Magnetics was spent touring the facilities and MODIS hardware, including the protoflight Scan Mirror motor in the thermal chamber, and the setups for the Scan Mirror Motor bearing tests (qualification unit and 20, 50 and 72 rpm tests in sealed bell jars). A good part of the time was spent discussing the logistics of replacing the GSE bearing in the 20 rpm chamber, which Schaeffer and SBRC are guessing will fail soon. In addition, I observed the noise problem with the Grating

Motor harmonic drive.

On another subject.... " Apollo 13 " was the flick shown on the red-eye flight (!?) home. I recommend it.

Author: Sal Cicchelli <scicchel@div720.gsfc.nasa.gov> at Internet
Date: 11/30/95 9:31 PM
Subject: GSE Bearing Replacement Strategy: Scan Mirror 20 rpm Bearing
----- Message Contents

Per discussion with SBRC and Schaeffer Magnetics during my recent trip, there are three basic issues which concern potential replacement of the GSE bearing in the 20 rpm bearing test chamber:

a. should a bearing replacement procedure and procurement be started now, before the bearing fails ? According to Schaeffer, it will be at least a couple of months to get the test up and running after the replacement bearing is installed.

My initial opinion on this: if time is not critical (the bearing test will continue beyond the EOS AM-1 launch) then wait until the bearing fails and then start the fix.

b. should the bearing be replaced with a magnetic bearing instead of one like the existing conventional one ?

My initial opinion on this: there is no apparent need to introduce an additional variable in the life test by changing the configuration. It is undesirable enough that the test has to be stopped and the vacuum broken. I vote for replacing the existing bearing with the same type. Cost and complexity will probably be less also.

c. contamination- Schaeffer plans to move the bell jar setup on a cart to a cleanroom before vacuum is broken. I believe that this strategy is satisfactory at this time.

6.0 Clarification of Two Items in November 21 SBRC SI&T Coordination

Meeting Handout (Structural Enhancements for FM1 Fold Mirror, Chips Around Edge of LWIR Window)

There was a conversation with Tom Koch on November 21 to go over two items in the Systems Integration and Test (SI&T) Coordination Meeting handout material for November 20:

a) Page 3. The incorporation of structural enhancements into the FM1 mirror is open for discussion. Two experts disagree on this. The question involves etching the glass. The edges of the holes will be chamfered.

b) Page 4. There were chips in three or four places around the edges of the LWIR window. The fractures occurred in the center of the edge. The

window was removed, the edges were cleaned, and the window was reinstalled with epoxy such that the epoxy went up over the edges of the glass. A vacuum leak test was run with a result way in the 10 to the minus 9 range. This was repeated by six thermal cycles between 60 degrees C and 85K. A leak retest was in the 10 to the minus 9 range. Although the window leak and temperature cycling retest went well, there is a high possibility that the window will be replaced in about the February to March, 1996 time frame. Jim Bell and Tom Endo did a structural analysis for the window and stress is not a problem. They computed 1200 psi and the window should take between 5000 and 10,000 psi. Note that although this window is not removed prior to flight, it is not needed for flight.

MR

12/4/95